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TOPOGRAPHIC AND GEOLOGIC SURVEY
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TIDIOUTE OIL POOL, WARREN COUNTY, PA.

By

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Introduction.

A preliminary report (Mimeograph Bulletin 51) on an oil pool in the Queen sand near Tidioute, was issued in September, 1922. At that time only 12 wells had been drilled to the Queen sand and the pool had not been defined. Since then an intensive drilling campaign has not only outlined the pool, but also has proved the absence of oil in paying quantities in the Queen sand for several miles in every direction. The present report describes the Tidioute pool in detail and discusses the results of wild-cat drilling in the vicinity of the pool. Fig. 1 shows the oil pools developed in the vicinity of Tidioute.

The town of Tidioute is on the banks of Allegheny River in the southwest corner of Warren County. It has a population of about 1200 people, most of whom are interested in some branch of the oil industry. The town is about one hour's drive by automobile from Warren, the county seat, a city of 14,000 people. The country around Tidioute is sparsely populated. This is due in part to the rugged topography. The river flows through a rather narrow valley between hill slopes too steep and rocky for farming. Most of the higher hills rise 600 feet or more above the level of the river. The tops of the hills are comparatively flat and all the farming is done on the hilltops or in the valley bottoms. The region is well drained by Allegheny River and its many small tributaries.

A branch of the Pennsylvania Railroad passes through Tidioute and connects with main lines both to the north and south. There is approximately two miles of improved road within the borough limits, but all other roads in Tidioute and the surrounding country are dirt

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FIG. 1. MAP OF TIDIOUTE OIL FIELD

roads. In fair weather the latter offer no obstacles to vehicular transportation, but after a heavy rain, roads in the valleys are muddy and slippery and sometimes impassible.

The oil pool in the Queen sand at Tidioute - hereafter referred to as the Queen sand pool - is more or less elliptical in form, the long axis having a northeast-southwest trend. The northeast end of the pool is about two miles southeast of Tidioute, and the southwest end not quite 3½ miles due south. All supplies for drilling, etc., are brought to the field by motor truck or heavy wagons.

Circumstances beyond the writer's control demanded that field work for this report be completed in one week. Since many elevations had to be obtained, this necessitated the use of a barometer rather than some more accurate instrument. No adequate base map was available upon which locations could be made and the only known bench-marks against which the barometer could be checked were in Tidioute, several miles from the oil pool. As a consequence the structure as worked out is not as reliable as the writer would desire. If the results given in this report do not check with later and more detailed work, it is to be hoped that the aforementioned handicaps will be recalled.

Stratigraphy. The stratigraphic section exposed near Tidioute extends from the lower part of the Pottsville conglomerate down to a horizon just below the sandstone named the Second sand by oil men years ago. The Venango group of oil sands (including the Second sand) has in recent years been placed by most geologists who have made a study of the strata in northwestern Pennsylvania or southwestern New York, in the transitional beds between the Chemung and Pocono formations. The name Catskill has been applied to these beds towards the east and although there is here no trace of the red color so typical of the Catskill elsewhere, it will be assumed that the lowest strata exposed near Tidioute are Catskill, until detailed paleontologic studies either verify or disprove the assumption.

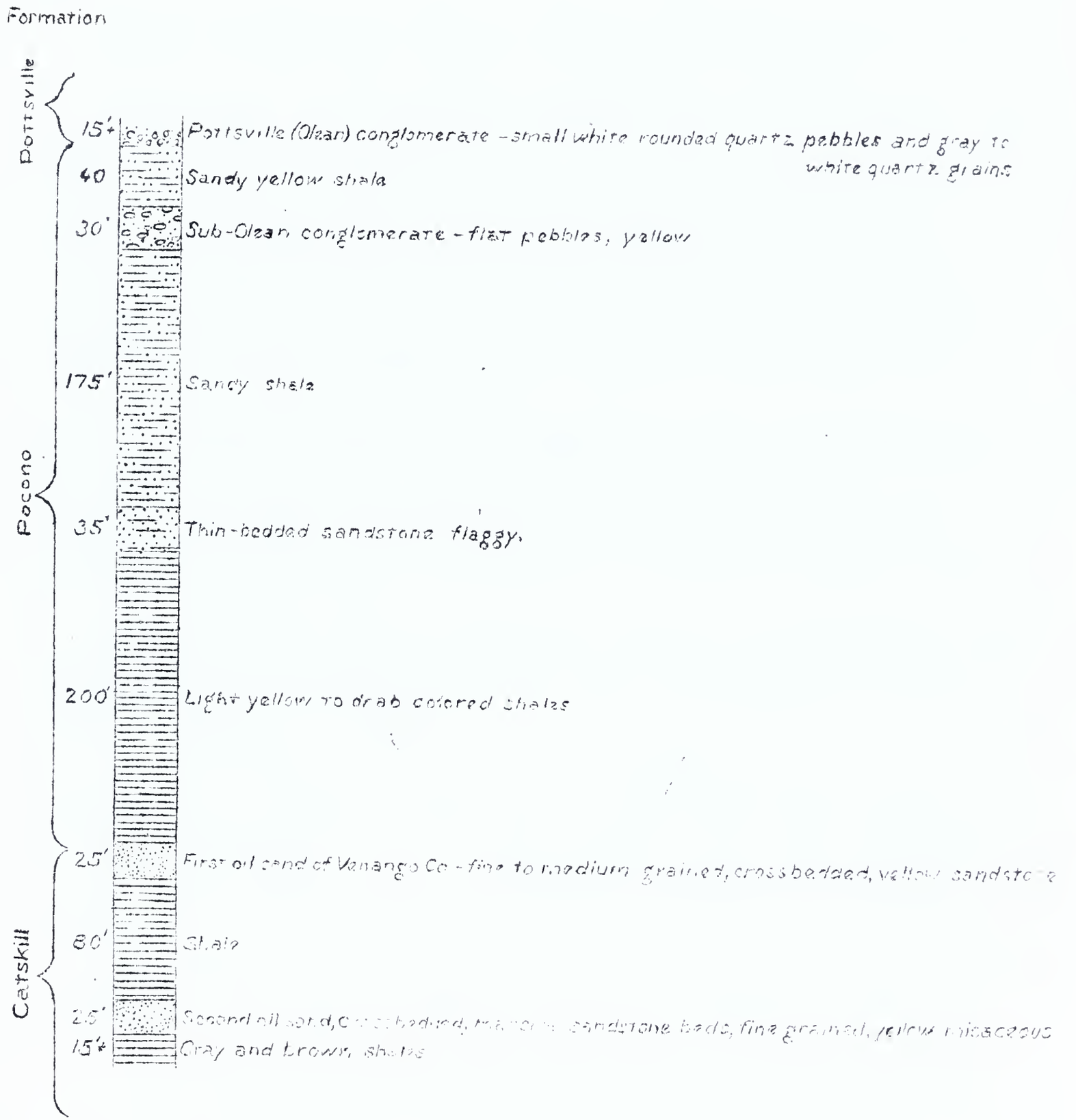
Fig. 2 illustrates and describes the rocks exposed near Tidioute.

Most of the wells in the Tidioute Queen sand pool start in the Pocono formation; some of the lower ones undoubtedly start in the Catskill. A few wells outside of the pool started in the Pottsville conglomerate.

Knowledge of the rocks below the Second oil sand is based upon the records of wells drilled for oil or gas, and upon a study of the rocks outcropping in nearby regions.

The Venango group of oil sands usually includes one other sand, the Third sand, in addition to those shown in fig. 2. Occasionally a Stray or the Fourth sand is recorded in drill-hole records. Below these sands there are usually one or two red beds, separated by drab shale, and then about 350 feet of Chemung "pink rock." The so-called "pink rock" of the drillers, is really brown and purplish shale and constitutes the top of the Chemung formation. The lower part of the Chemung is sandier and includes all of the oil sands from the Venango

FIG. 2. SECTION OF ROCKS EXPOSED NEAR TIDIOUTE



group down to the Cooper and Bradford sands, the lowest of which may be of Portage age. Well records show that these sands (the Warren group) are very irregular and local in their occurrence, however, and in some wells almost the entire group is missing.

Only a few wells have penetrated the Portage formation, but these indicate that it is shalier here than is usual.

Structure. The rocks outcropping in the Tidioute region have in general a monoclinal structure, dipping gently to the south. From dips observed in the field, however, it is believed that there are local rolls in the structure which possibly are reflected in the deeper beds. Since it is a well-known fact that the structure of a deeply buried sandstone may be quite different from that of the rocks at the surface, it was thought better to plot the structure of the Queen sand than to determine the detailed structure at the surface. In order to do this all available records of wells drilled near Tidioute were obtained and the elevations of the tops of the wells determined. Fig. 3 represents the structure of the top of the Queen sand as drawn from the well data.

It will be noticed that all the best wells in the Queen sand pool are located on a nose in the structure which rises rapidly from the southwest. On the other hand; if the structure as drawn is correct, and the sand is not too tight, it is difficult to see why wells drilled to the Queen sand on the two domes indicated were dry. Such results cast doubt upon the efficacy of a structure map based upon barometric elevations.

A convergence sheet, showing the interval at every well between the Third sand and the Queen sand, was constructed in the hope that additional light might be thrown on the reasons why oil accumulated only in the narrow belt shown in fig. 3. This sheet, fig. 4, is shown on page 7.

An indication of the northeast-southwest trend of the line of deposition in the ancient sea in which the Queen sand was laid down, is shown along the southeast boundary of the White Oil Corporation's lease. The long axis of the pool parallels that trend and it may well be that differences in the size and arrangement of material deposited at that time, to a large extent control the location of the oil pool.

Another point that is brought out very well is that the difference in interval between the Third sand and the Queen sand, had practically no effect on the location of the pool.

Before disposing of the subject of structure, it should be mentioned that there is an erosional unconformity at the base of the Pottsville conglomerate. It has been determined that previous to Pottsville time, the region was tilted from north to south. Erosion followed and the Pottsville conglomerate was deposited on successively younger beds from north to south. Since nearly all the wells in the Tidioute field start below the base of the Pottsville the

FIG. 3. STRUCTURE CONTOUR MAP OF QUEEN SAND
IN VICINITY OF TIDIOUTE, WARREN COUNTY, PENNA.

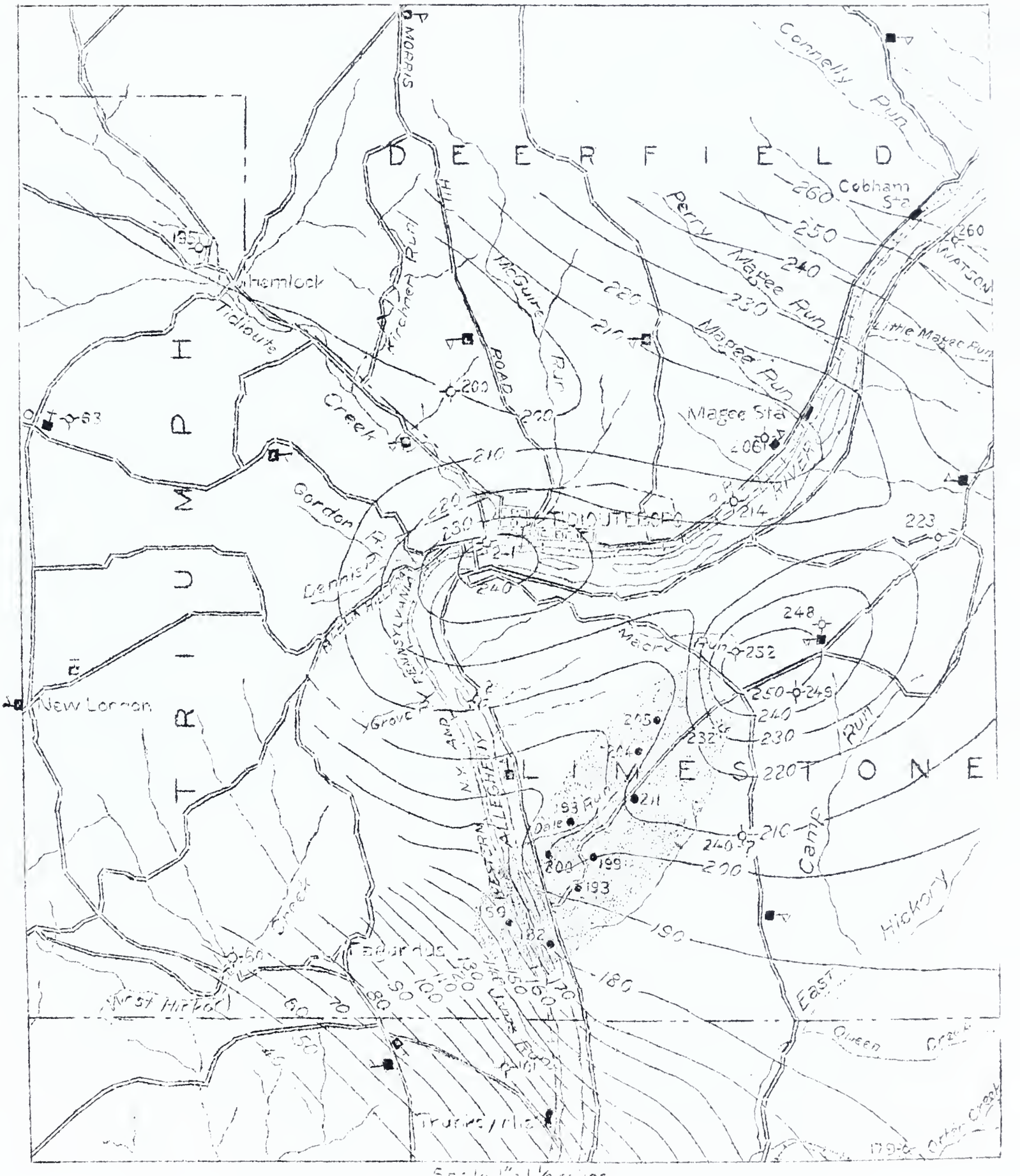
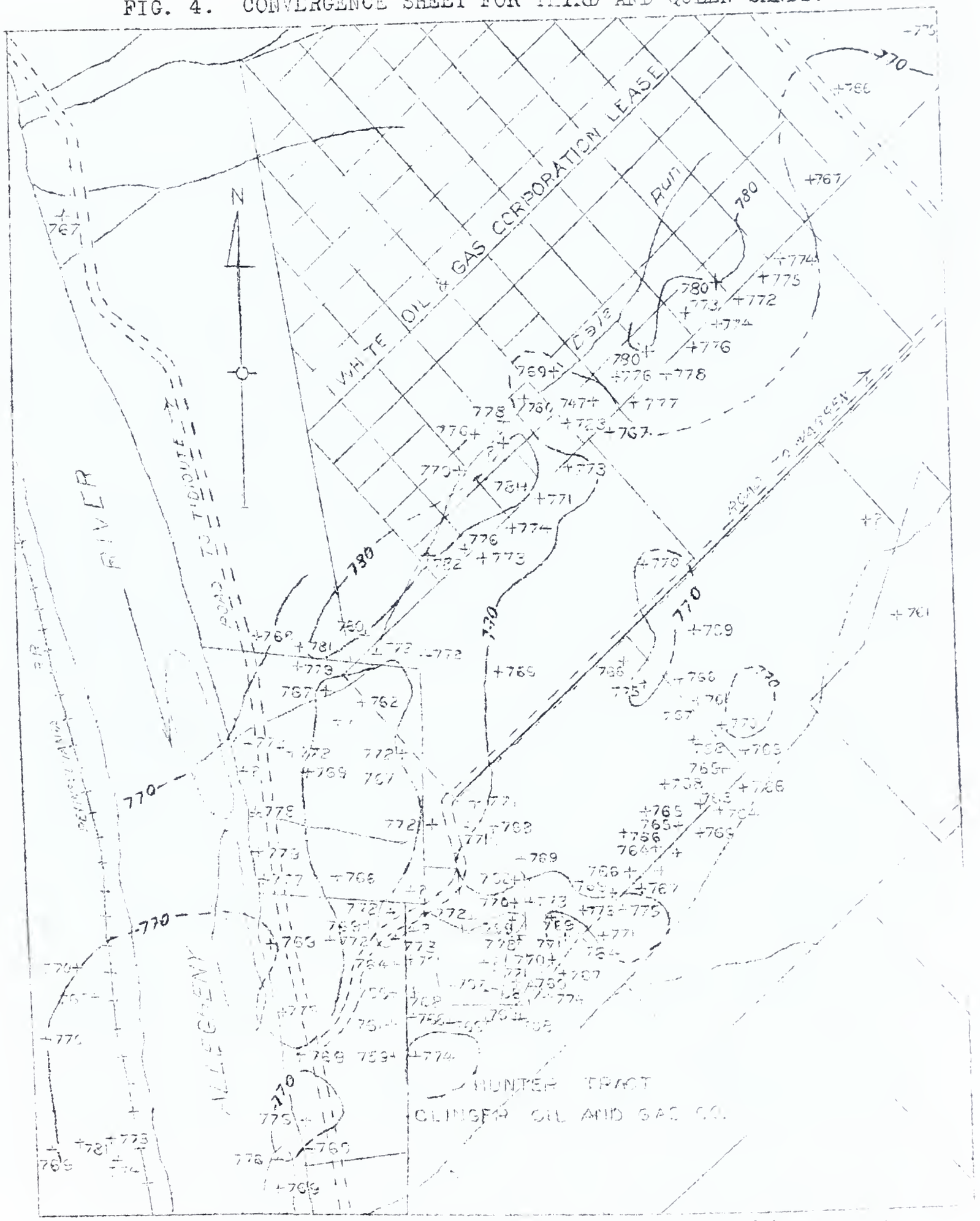


FIG. 4. CONVERGENCE SHEET FOR THIRD AND QUEEN SANDS.



Figures denote intervals between top of Third sand and top of Queen sand

Lines connecting points of same interval shown thus

effect of this unconformity upon drilling operations is small. Those operators who start their wells at a horizon above the base of the Pottsville, however, must realize that they will have to drill deeper and deeper as the drill is moved south in order to strike the same sand, although the wells may all start at the same stratigraphic horizon.

History of development. Commercial quantities of oil have been found in four, possibly five, different sands in the vicinity of Tidioute. These are, in descending order, the Second, Stray or Stray Third, Third, Fourth and Queen sands. Oil was first found in the Third sand in a well drilled on Tidioute Island in the winter of 1860. Since that time wells have been drilled in all directions from Tidioute and several good-sized pools developed (see fig. 1). The small Second sand pool, shown at the junction of Kirchener Run with Tidioute Creek, was developed many years ago and is now abandoned. About a dozen wells were drilled, averaging about 85 feet in depth. The oil obtained was a very high-grade lubricating oil and commanded a good price. Unfortunately all the wells were small producers and the pool played out after a few years.

Practically nothing could be learned about the small Fourth sand pool one mile west of Tidioute. At the time it was visited there was no one about and none of the wells were being pumped. However, tanks at some of the wells and rods connecting them to a pumping station would indicate that some wells at least are still in operation. Although local operators believe this to be a Fourth sand pool and it has been mapped as such, it is probable that the Stray sand was here called the Third, and the Third sand, Fourth; so that in reality the oil is coming from the Third sand.

In 1866 oil was discovered in the Stray sand in wells drilled along Dennis Run. Wells near Fagundus discovered oil in the same sand. The oil produced was much darker than that obtained in the Third sand and was called "black oil." The pools were very closely drilled and quickly declined in production. At the time the wells were drilled, the oil was thought to be coming from the Third sand. Fortunately this was not the case and when in 1869 a well owner in cleaning out his well drilled deeper, he found green oil in a sand, the Third, a short distance below the Stray. This led to a new drilling campaign and the whole field was worked over again. Many of the Third sand wells are still being pumped at the present time.

South of Tidioute local operators are still obtaining oil from some of the old wells drilled on the Economy tract. The Third sand pool here in part overlaps the new Queen sand pool.

Little is known of the two small Third sand pools shown to the north and northwest of Tidioute. The one to the northwest is now abandoned. Oil in small quantities is still being pumped from wells in the other.

One other small pool in the Third sand was developed some years ago just south of present operations in the Queen sand pool. The

wells were all small and never caused any excitement. Most of them are still being pumped.

Near the junction of Queen Creek with East Hickory Creek a fair sized gas pool was developed a number of years ago in the Queen sand. The sand is nearly 100 feet thick there and the wells proved to have good staying qualities. About the same time a small oil pool was discovered in the Queen sand just north of the gas belt. The wells came in with initial flows of 2,000 bbls. or more, but quickly dropped off, and in a short time the production was so small that all wells were abandoned.

Present development - Queen sand pool. The discovery well in this pool was drilled into the sand and commenced flowing April 20, 1922. The initial flow was only 20 bbls., but deepening increased the flow to 120 bbls. in 24 hrs. The latter production was sufficient to attract other operators to the field and development has proceeded rapidly from that time until recently. In May, 1923 the pool was outlined by dry holes and light producers in almost every direction. Particularly is this so to the northeast and southwest. The No. 8 well of F. C. Proper et al. on the Hoffman tract sounded the death knell to hopes that the pool would extend southwest into Forest County; whereas the Kapp and Brocklehurst well on the property formerly owned by Merkle and located about two miles southeast of Tidioute definitely defined the northeast end of the pool. In all about 235 wells have been put down in the vicinity of Tidioute in the attempt to find a commercial supply of oil in the Queen sand. Of this number some 180 have obtained oil in sufficient quantities to make it worth while to connect the wells with a pipe-line.

In previous reports a small amount of data was given concerning the depths to the various sands, their thicknesses, etc. The following records are given to supplement that data:

(1) Dry hole on Clifton farm, Deerfield twp., 1½ mi. NNW of Tidioute. Drilled by McGovern & Allen and completed in winter of 1922.

Elevation at well mouth (barometric) - - -	1285
Third sand -	329-
Queen sand (salt water) - - - - - - - - - - - -	1085-1086

(2) No. 8 well on Hoffman lease, F. C. Proper owner, located at SW end of pool on west side of river, about 3 miles S. of Tidioute. Drilled in April, 1923. Dry hole.

Elevation at well mouth (barometric) - - -	1458
Casing -	to 325
No First, Second or Third sand	
Queen sand - - - - - - - - - - - - - - - - - - -	1305-1314

(3) No. 1 well on Davidson lease, Benedum-Trees owner, located in SW corner of warrant 5204, Limestone twp., and about 3 miles SE of Tidioute. Drilled in 1922. Dry hole.

Elevation at well mouth (barometric)	1700
Conductor	to 19
Casing	" 324
First sand	458-526
Second sand	516-544
Shell	555-
Third sand	702-707
Pink rock	828-1202
Chemung sand	1202-1215
First Warren sand	1260-1345
Pebble shell (Queen sand)	1460-

(4) United Natural Gas Co. well #3095 on Wheeler & Co. property, warrant 5209, Hickory twp., Forest Co.; about 5½ mi. SE of Tidioute. Completed in July, 1918.

Elevation at well mouth	1421.52
Conductor	to 32
Casing	" 321
Slate and shells	32-246
White sand (fresh water)	246-300
Red rock	300-325
Second sand	325-332
Slate	332-365
Stray sand	365-370
Slate	370-462
Third sand (salt water)	462-469
Red rock	469-487
Slate	487-507
Red rock	507-547
Slate	547-618
Pink rock	618-950
Slate	950-1047
Gray sand	1047-1072
Slate and shells	1072-1192
Queen sand Gas	1192-1281
Slate	1281-1314
Total depth	1314

(5) Hague Oil Co. well No. 1 on Bayon property, Limestone twp., 1¼ mi. S of Tidioute. Completed in 1922. Dry hole.

Elevation at well mouth (barometric)	1130
Third sand	152-
Queen shells	900-
Queen pay sand	920-
Sand	1033-1035

(6) Charles Carnahan's No. 3 well (discovery well) on Mrs. Clara Siggins property, Limestone twp., 2½ mi. S. of Tidioute. Completed April 20, 1922.

Elevation at well mouth		1190
Third sand		221 - 229
Fourth sand, show of oil		265 - 279
Queen pay sand	Oil	990 -1002

(7) Clinger Oil & Gas Co's. #3 well on Cartney property, ¼ mile NE of discovery well. Completed in spring of 1923. Small oil well.

Elevation at well mouth (barometric)		1250
Conductor	to	12
Casing - 6¼"	"	211
Queen sand (3' white sand (5' slate (3' white sand	Oil	1064-1075

(8) Clinger Oil & Gas Co's. #2 Hunter, 2 3/4 mi. SSE of Tidioute, well completed in July, 1922. Initial production - 700 bbls.

Elevation at well mouth		1293
Conductor	to	65
Casing - 8"	"	185
" - 6¼"	"	406
Third sand		332 - 342
Pink rock		515 - 850
Stray sand		858 - 865
" "		1000 -1020
Queen sand (Pay sand 1103½-1114½)		1050 -1139½
Total depth		1139½

(9) White Oil Corp. well #25 on Irvine property, Dale Run, Limestone twp. Completed July 6, 1922. Initial production, 30 bbls.

Elevation at well mouth	1175
Second sand	54 - 70
Third sand	201 - 214
Fourth sand	254 - 256
Pink rock	360 - 730
Warren sand	790 - 810
Queen sand	942 -1031
Pay sand	983 - 991

(10) White Oil Corp. well #39 on Irvine property, ½ mile NE of well #25. Completed January 4, 1923. Initial production 32 bbls.

Elevation at well mouth - - - - - - - -	?	
Yellow mud - - - - - - - - - - - - - - -	0 -	14
Sand and crevices - - - - - - - - - - - -	14 -	25
Slate - - - - - - - - - - - - - - - - -	25 -	55
Shells - - - - - - - - - - - - - - - - -	55 -	75
Slate - - - - - - - - - - - - - - - - - -	75 -	100
Hard sand - - - - - - - - - - - - - - - -	100 -	125
Slate - - - - - - - - - - - - - - - - - -	125 -	250
Sand - - - - - - - - - - - - - - - - - -	250 -	274
Slate - - - - - - - - - - - - - - - - - -	274 -	335
Second sand - - - - - - - - - - - - - - -	335 -	360
Slate - - - - - - - - - - - - - - - - - -	360 -	390
Salt sand - - - - - - - - - - - - - - - -	390 -	404
Slate - - - - - - - - - - - - - - - - - -	404 -	485
Third sand (Third Stray) - - - - - - - -	485 -	498
Slate - - - - - - - - - - - - - - - - - -	498 -	525
Fourth sand (Third) - - - - - - - - - -	525 -	545
Slate - - - - - - - - - - - - - - - - - -	545 -	650
Pink rock - - - - - - - - - - - - - - - -	650 -	1005
Hard sand - - - - - - - - - - - - - - - -	1005 -	1020
Slate - - - - - - - - - - - - - - - - - -	1020 -	1115
Hard sand - - - - - - - - - - - - - - - -	1115 -	1145
Slate - - - - - - - - - - - - - - - - - -	1145 -	1205
Queen sand (pay) - - - - - - - - - - - -	1258 -	1266

Total depth - - - 1266

(11) Clinger Oil & Gas Co. well #1 on Cracky-White property, 2½ mi. SE of Tidioute. Completed 10-24-22. Initial production, 5,250,000 cubic feet of gas.

Elevation at well mouth - - - - - - - -	1528	
Conductor - - - - - - - - - - - - - - - -	0 -	20
Second sand - - - - - - - - - - - - - - -	350 -	362
Sand - - - - - - - - - - - - - - - - - -	370 -	450
Pink rock - - - - - - - - - - - - - - - -	705 -	1025
Queen pay sand - - - - - - - - - - - - -	1295 -	1300

(12) Brocklehurst & Kapp well on own property (formerly Merkle), 1 3/4 mi. E SE of Tidioute. Completed May 10, 1923. Dry hole.

Elevation at well mouth (barometric) -	1720
Third sand (shells only) - - - - - - - - - -	702½
Queen sand (pay streak) - - - - - - - - -	1468-1471
Total depth - - - - - - - - -	1492

(13) Benner well, also known as Dunham, near McKean school, at fork of roads 2 miles E SE of Tidioute. Completed September 6, 1922. Dry hole.

Elevation at well mouth (barometric) - -	1660	
Conductor - - - - - - - - - - - - - - - - - -	to	14
Casing - - - - - - - - - - - - - - - - - - -	to	430
Sandstone - - - - - - - - - - - - - - - - -	375 -	390
Second sand - - - - - - - - - - - - - - - -	410 -	421
Third sand, show of oil - - - - - - - - - -	509 -	522
Pink rock - - - - - - - - - - - - - - - - -	795 -	1167
Chemung sand - - - - - - - - - - - - - - -	-1167	-1177
Sandstone - - - - - - - - - - - - - - - - -	-1347	-1367
Queen sand (white) - - - - - - - - - - - -	-1412	-
Total depth - - - -	1532	

(14) E. E. Norton well #1 on Grellhart property, Deerfield twp., near Magee Station. Completed in August, 1922. Dry hole.

Elevation at well mouth (barometric) - -	1227	
Stray sand - - - - - - - - - - - - - - - - -	-135 -	145
Third sand - - - - - - - - - - - - - - - - -	-218 -	219
Pink rock - - - - - - - - - - - - - - - - -	-	740
Queen shells - - - - - - - - - - - - - - - -	-931	-
" tight sand - - - - - - - - - - - - - -	985 -	993
" clover seed sand - - - - - - - - - - -	993 -	998
" bottom of formation - - - - - - - - -		-1000
Sandstone - - - - - - - - - - - - - - - - -	1068	-1078
Shell - - - - - - - - - - - - - - - - - - -	1096	-
Sandstone - - - - - - - - - - - - - - - - -	1116	-1136
Total depth - - - - - - - -	1160	

(15) Charles E. Carnahan well on Hunter and Anderson tract, Watson twp., along the river 5 miles NE of Tidioute. Completed in Feb. 1923. Dry hole.

Elevation at well mouth (barometric) -		-1150	
Third sand)		- - -	-122 -
Queen sand)	Sands very poor	- - -	-890 -
Sand)	and broken	- - -	1840 -
Sand)		- - -	2150 -
Total depth - - -		- - -	2940

(16) Youngsville deep well, drilled by Star Oil Co., Broken Straw twp. Completed in fall of 1922. Dry hole.

Elevation at well mouth (barometric) -	-1208	
Drive pipe - - - - - - - - - - - - - - - -	to	63
Casing - 5 5/8" - - - - - - - - - - - - - -	"	420
Pink rock - - - - - - - - - - - - - - - - -	80-	410

Stray sand	663	-
White sand (Queen)	669	- 679
Sand	835	- 850
Sand	1035	-1050
Stray sands	1100	-1350
Sand	1350	-1400
Shale	1400	-1600
Sand	1600	-1650
Shale	1650	-1975
Shells (hard)	1975	-1990
Shale	1990	-2060
Pink shale	2060	-2080
Gray shale	2080	-2270
Sand	2270	-2300
Shale	2300	-2360
Pink shale	2360	-2380
Black slate	2380	-2410
Pink shale	2410	-2420
Sand	2420	-2440
Shale	2440	-2490
Shell	2490	-2495
Black slate	2495	-2530
Sand	2530	-2540
Black slate	2540	-3088
Hard lime shell	3088	-3100
Black slate	3100	-3215
Hard lime shell	3215	-3235
Black slate	3235	-3350
Hard shell	3350	-3352
Black slate	3352	- 3385
Lime	3385	-3507
Some gas at 3463. Water at 3488		
Break (shale)	3507	-3510
Stray sand	3510	-3520
Lime shells	3520	-3560
Black slate	3560	-3651
Shell	3651	-3653
Stray sand (Oriskany?)	3653	-3700
Lime	3700	-3780
Shale	3780	-3800
Lime	3800	-3880
Shale	3880	-3885
Salt	3885	-3910
Break	3910	-3940
Cave	3940	-3945
Shale	3945	-3980
Cave	3980	-3990
Shale	3990	-4020
Hard lime shell	4020	-4025
Shale	4025	-4060
Hard shell	4060	-4065
Red shale	4065	-4140
Green shale	4140	-4148
Black shale	4148	-4155

Hard lime shell	4155 - 4170
Black and green slate	4170 - 4185
Shell	4185 - 4190
Green slate	4190 - 4195
Stray sand	4195 - 4205
Black slate	4205 - 4210
Stray sand	4210 - 4220
Shell	4220 - 4230
Lime	4230 - 4375
Sand (black water at 4380)	4375 - 4400
Lime	4400 - 4435
Clinton sand (pink)	4435 - 4455
Break	4455 - 4467
Green and black shale	4467 - 4517
Lime shell	4517 - 4522
Green shale	4522 - 4537
Top of red sandstone (Medina)	4537 -
Red and gray "	4537 - 4745
Break	4745 - 4782
Stray sand, red	4810 - 5035

Total depth - - - 5035

Cost of drilling. The cost of drilling wells to the Queen sand in the Tidioute region averages about $1600. That figure covers only the cost of drilling the hole and does not include the cost of casing, tubing, pumping equipment, etc.

Usually wells are drilled under a contract stating that the contractor shall receive a fixed sum per foot for each foot of hole drilled down to the top of the "pay sand." This places a bonus upon speed in drilling down to that point. The contract also provides that the well be drilled in and necessary connections made at a fixed sum (usually $50.00) per day. This part of the contract removes the incentive for speed and hence this delicate part in the drilling of a well receives careful attention instead of being rushed through to completion. Were it not for the second clause the contractor would lose money during the several days necessary for properly completing a well.

The following is a fairly representative cost statement of a well drilled in the Tidioute field:

1323 ft. 6 in. @ $1.00 per ft.	=	$1323.50
Drilling, 1 day @ $50.00	=	50.00
Moving boiler 1 day @ $50.00	=	50.00
Drilling sand " " " "	=	50.00
" pocket below sand @ $50.00	=	50.00
Completing well connections, etc. @ $50.00	=	50.00
Total	-	$1573.50

The contractor is furnished with both fuel and water by the owner of the lease. The total cost of a finished well, including all expenses for drilling, casing, hauling, pumping equipment, etc., is approximately $4000.00.

Production. The peak production of the Queen sand pool was reached sometime in the fall of 1922 and probably did not exceed 1500 bbls. a day. By February 1, 1923, it had dropped off to 1040 bbls. a day, and by May 1, 1923 it was down to 700 bbls. a day. The recent drop in production is due in part to a partial cessation of drilling. Nearly all property offset wells inside the limits of the pool have now been drilled and future drilling, being inside drilling, will naturally be at a much slower rate. The drop in the price of crude oil has also contributed to the curtailment of drilling operations.

The following data illustrate more concretely this rapid drop in production:

On one small tract, 5 wells which had a combined initial production of 1265 bbls., were producing on May 1st only 15 bbls. a day. On another lease, a large one, the average production per well on May 1st was only 4 bbls. The following is the record of the average daily production of one well situated near the center of the pool:

August & September,	1922 =	44.	bbls.
October	" =	20.	"
November	" =	7.	"
December	" =	9.	"
January	1923 =	7.3	"
February	" =	4.0	"

Total production Aug. 9, 1922 to Jan. 1, 1923 = 3496.28 bbls.

Although many of the wells in the Queen sand pool are now being pumped, most of them still flow naturally. The natural gas, which causes the oil to flow and which formerly issued from some of the oil wells in considerable volume (± 200,000 cu. ft.), is now (May 1st, 1923) approaching exhaustion and it is expected that most of the wells now flowing naturally will be pumping within a few months.

At the present time the production of most (if not all) of the wells in the pool is handled by the National Transit Pipe Line Co. and sold to the Tidioute refinery. Compression plants have been installed on some of the larger leases, and gas from the oil wells on those leases is run through the plants and the gasoline extracted. The residual or dry gas is sold to the Tidioute refinery. Tests have shown that the wet gas contains from 1½ to 2 gallons of gasoline per 1,000 cubic feet of gas, but at the present time not more than 1 gallon per 1,000 cubic feet is being obtained.

The potential supply of gas (reported to be 20,000,000 cubic feet daily) from wells drilled on the eastern edge of the pool, has only been utilized to a small extent as yet. Some six or seven wells have been drilled and the reported average rock pressure is about 500 lbs. per square inch.

Future development. Inasmuch as the Queen sand pool has already been fairly well defined, future drilling in that area will be largely confined to inside drilling. Doubtless this will be done on a conservative plan and only those wells will be drilled that are necessary for the complete recovery of available oil.

Prospecting for oil in the Queen sand has already extended for miles in every direction from the Tidioute pool and although no other pools have been found as yet, it is believed that the stimulus offered by the possibility of opening up another pool similar to the one recently discovered, will be sufficient to cause operators to continue the search for some time to come. Many of the old shallow pool districts in the region around Tidioute have never been thoroughly prospected for the deeper sands and it is quite possible that more than one pool, comparable to the Tidioute pool, will be opened up in the next few years.